

WHAT IS CLAIMED IS:

1. In a workpiece supporting device including a work table relatively movable to a tool and supporting a workpiece, and a clamping member clamping said workpiece relative to said work table, said workpiece supporting device comprising:

5 plural seating mechanisms disposed between said workpiece and said work table to support detachably said workpiece on said work table; and

each of said seating mechanisms includes a load sensing element assembled to receive said clamping force, said load sensing element is not substantially deformed by an applied load.

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2. In a workpiece supporting device including a work table relatively movable to a tool, a workpiece pallet supporting a workpiece, and a clamping member clamping said workpiece pallet on said work table, said workpiece supporting device comprising:

15 plural seating mechanisms disposed between said workpiece pallet and said work table to support detachably said workpiece pallet on said work table to support indirectly said workpiece; and

each of said seating mechanisms includes a load sensing element assembled to receive said clamping force directly, said load sensing element is not substantially deformed by an applied load.

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3. In a workpiece supporting device including a work table relatively movable to a tool, a workpiece receiving unit mounted on said work table for supporting a workpiece, and an actuator mounted on said workpiece receiving unit for fixing said workpiece to said work table, said workpiece supporting device comprising:

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plural seating mechanisms mounted on said workpiece receiving unit to support said workpiece detachably and directly; and

each of said seating mechanisms includes a load sensing element assembled to receive a fixing force fixing said workpiece directly, said load sensing element is not substantially deformed by an applied load.

5 4. In a workpiece supporting device including a work table relatively movable to a tool, a workpiece pallet supporting a workpiece, and a clamping member clamping said workpiece pallet on said work table, said workpiece supporting device comprising:

 a workpiece receiving unit mounted on said workpiece pallet;
10 plural seating mechanisms mounted on said workpiece receiving unit to support said workpiece detachably and directly; and
 each of said seating mechanisms includes a load sensing element assembled to receive a fixing force fixing said workpiece directly, said load sensing element is not substantially deformed by an applied load.

15 5. A workpiece supporting device according to one of Claims 1 to 4, wherein said load sensing element consists of a ceramics material.

 6. A workpiece supporting device according to one of Claims 1 to 4, wherein
20 a pressure sensing body of said load sensing element consists of a composite material dispersing a filling material in a matrix;

 said filling material has a pressure resistance effect or a magnetic resistance effect; and

 said matrix consists of an electric insulation ceramics material.

25 7. A workpiece supporting device according to one of Claims 1 to 6, wherein said workpiece supporting device further comprising:

 a controller detecting an abnormal clamping or an abnormal fixing clamping said workpiece relative to said work table and outputting a control signal; and

said controller reads an output from said load sensing element included in said plural seating mechanisms and compares each value of said output or an average value of said output to a predetermined first threshold value to detect said abnormal clamping.

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8. A workpiece supporting device according to one of Claims 1 to 6, wherein said workpiece supporting device further comprising:

a controller detecting an abnormal overload during a machining by said tool and outputting a control signal; and

10 said controller reads an output from said load sensing element included in said plural seating mechanisms and compares each value of said output or an maximum difference of outputs to a predetermined second threshold value to detect said abnormal overload.

15 9. A workpiece supporting device according to one of Claims 1 to 6, wherein said workpiece supporting device further comprising:

a controller detecting an abnormal clamping or an abnormal fixing clamping said workpiece relative to said work table and an abnormal overload during a machining by said tool and outputting a control signal; and

20 said controller reads an output from said load sensing element included in said plural seating mechanisms and compares each value of said output, an average value of said output or an maximum difference of outputs to a predetermined first and a second threshold values to detect said abnormal clamping or fixing and said abnormal overload.

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10. A workpiece supporting device according to one of Claims 7 to 9, wherein said workpiece supporting device further comprising:

an another load sensing element included in at least two or more seating mechanisms and having the same sensing characteristic to said load sensing element

for a temperature compensation to compensate said output from said load sensing element by an output from said another load sensing element included in the same seating mechanism.

- 5 11. A seating mechanism for a machine tool supporting a workpiece machined by a tool, wherein said seating mechanism comprising:
- a body having a guide hole;
 - a plunger inserted into said guide hole and contacting to a reference surface of said workpiece by one end of said plunger to support said workpiece;
 - 10 a load sensing element inserted into said guide hole and contacting to the other end of said plunger to detect clamping force acting on said plunger;
 - said load sensing element includes a pressure sensing body consisting of a composite material dispersing a filling material in a matrix so that said load sensing element is not substantially deformed by an applied load;
 - 15 said filling material has a pressure resistance effect or a magnetic resistance effect; and
 - said matrix consists of an electric insulation ceramics material.

- 20 12. A seating mechanism for a machine tool supporting a workpiece machined by a tool, wherein said seating mechanism comprising:
- a body having a guide hole;
 - a plunger inserted into said guide hole and contacting to a reference surface of said workpiece by one end of said plunger to support said workpiece;
 - said plunger includes a pressure sensing body consisting of a composite
 - 25 material dispersing a filling material in a matrix so that said load sensing element is not substantially deformed by an applied load;
 - said filling material has a pressure resistance effect or a magnetic resistance effect; and
 - said matrix consists of an electric insulation ceramics material.